Soil Survey of Vermillion County.

By H. N. CORYELL, Assistant State Geologist.

LOCATION AND DESCRIPTION.

Vermillion County lies on the west bank of the Wabash River thirty miles north of Terre Haute. The Illinois State line forms its west boundary. At no point is this county over ten miles wide nor less than five. It is one of the longest counties of the State and contains approximately 252 square miles.

Topographical features divide the county into three distinct regions: first, the alluvial soils and river bottom; second, the rolling lands; third, the prairies. The first of these is a narrow strip of land that follows the general meanderings of the river. At Clinton it is only a mile wide but gradually widens northward and again returns to the river just north of Hillsdale. Two miles south of Newport the bottom land is one and a half miles wide and retains that width northward to Little Vermillion River. North of this river it widens to two and a half miles. At Dickason the alluvial soils are three and a quarter miles wide and are known locally as the Black Sand Prairie. One mile north of Perryville the terraces end. In the remaining sections northward the alluvial soil consists of only the river bottom deposits of a quarter of a mile or so in width. The Sioux, Wabash and Muck series constitute the soils of the first district and their description will be given in following papers.

The second district lies to the west and adjacent to the first. It consists of the hilly and rolling land. This is spoken of as the upland soils, consisting of the Miami and Carrington series. The forests of Vermillion County grew principally upon these rolling uplands, of which a few wood lots remain, that barely give us more than an idea of the species of trees that composed these early forests.

The third region lies to the west of the second and is not continuous throughout the county from north to south. In fact there are only two districts that make up this division; one lying about Dana in Helt Township and the other about Gessie in Highland Township. These are the prairie regions of Vermillion County,

being the eastern limits of two of the lobes of the Illinois prairie, or Chicago prairie that project into Indiana. Here are located the prize farming lands. Of these three the second has received the least attention, and having been deprived of its forest covering by use and waste so completely, precipitation, that usually finds its way into the soil and flows out into springs, now runs off and becomes an active agent of soil erosion. On steep slopes, gullies, and deep narrow ravines are evidences of the great work that it is able to do. The soil with the available plant food is removed and reclamation becomes a very difficult task. The springs are more intermittent than several years ago and often cease to flow during the summer months. The rougher portions are being turned into blue grass pastures, or, as in a few limited areas the owners have planted vineyards that prove good investments. This vegetative protection conserves moisture, decreases erosion, and assists in restoring the soil to a more fertile state.

Population.

Very few counties have shown so great an increase in the number of its people within the last three or four years as the county of Vermillion, especially the southern townships of Clinton. The following table gives an idea of the rapid increase due to the extensive development of the coal mines and the influx of capital from Chicago for like purposes:

Table.	*1913 estimates.*	*1910*	*1900*	*1890*
Clinton Township and cities....	14,000	9,391	5,193	3,609
Clinton City.....	10,000	6,229	2,918	1,365
Fairview	700	630	....	....
Bunsen	750	....	....	....
Rhodes	150	....	....	....
Needmore	50	....	....	....
Centenary	450	....	....	....
Jacksonville	150	....	....	....
Geneva	130	....	....	....
Helt Township and towns.....	4,000	3,543	3,799	3,474
Dana	900	748	893	495
Summit Grove	50	....	....	....
Hillsdale	425	....	....	....
Highland	40	....	....	....
Alta	75	....	....	....
St. Bernice	275	....	....	....
Jones	150	....	....	....
Scissorville	20	....	....	....
Toronto	50	....	....	....

TABLE.	*1913 estimates.*	*1910*	*1900*	*1890*
Vermillion Township and towns.	2,000	1,974	2,089	2,175
Newport	750	732	610	551
Quakers	30	....	....	....
Eugene Township and towns....	2,250	2,112	2,038	1,664
Cayuga	1,000	911	832	....
Eugene	300	....	....	....
Highland Township and towns..	2,100	1,845	2,133	2,232
Perrysville	600	....	....	....
Gessie	250	....	....	....
Rileysburg	30	....	....	....
Vermillion County	24,550	18,865	15,252	13,154

CLINTON CITY.

Clinton, named in honor of the early governor of New York, DeWitt Clinton, was laid out in 1824 by William Harris, who was at that time a resident of Martin County, Indiana; however, the records at Newport show that Clinton was platted and recorded by Lewis P. Rogers on January 8, 1829. This was probably a corrected and legal platting of the original town.

At first the growth of the town was very slow and during the civil war was a mere village. The railroad gave it new impetus and from that time (1868) it has steadily grown to its present size (10,000), based upon stable industries and natural resources. Aside from the mining element, the population is largely American. The former have settled principally in a portion of Clinton known as Italy, and people of that nationality own and operate practically all of the business institutions upon the plan of the progressive American system.

As a residence town Clinton is busily engaged in paving its streets, building walks and erecting new homes. This growing town is not only a desirable place to live, but in a few years it will be a beautiful location. The school system is equal to any in the State and the newly erected buildings furnish ample and modern accommodations. Facilities for developing parks, gardens and a beautiful water front lay at the city's command and no doubt will be taken into account in due time.

The commercial interests may be listed as the extensive coal mining, the agricultural trade and clay industries. These will be discussed at length under separate topics elsewhere. Other industries, as machine shops, shirt factories, flouring mills, ice plants, and many smaller business institutions insure Clinton a steady growth.

Mining Camps.

Throughout the township of Clinton are many mining camps. These have been laid out as small villages and are inhabited for the most part by mixed nationalities. Rhodes, Bunsen, Centenary, Klondike and Jacksonville are among the busy camps. Their people find work in the mines that are sunken close by. The population of these villages fluctuates with the immediate operation of the mines that caused their growth. During a slack season the laborers must shift to other mines and then return during the busy seasons.

Shale outcrops north of Cayuga along Big Vermillion River. The exposure at this place has a depth of 15 feet.

Summit Grove.

Summit Grove is a small village situated on the Chicago and Eastern Illinois Railroad about four miles north of Clinton. It has a population of about fifty. A splendid gravel pit is located here and gravel shipments are the principal local commerce except during the autumn, at which time Summit Grove is a shipping point for the farm crops of wheat, corn and oats.

Hillsdale.

Hillsdale has a population of 425. It is located in the eastern part of Helt township at the junction points of the Chicago and Eastern Illinois, and Cincinnati, Hamilton and Dayton railroads.

It has a splendid view to the east over the Wabash bottom land. It is a beautifully located village upon the Wabash bluffs.

The clay works give ample employment to the people of this town and often it is necessary to employ laborers from other places.

Hillsdale is electrically lighted, the power being furnished by the clay company.

Alta, Highland and West Montezuma.

Alta is really a part of Hillsdale. It is located only a short distance south of the latter town and depends upon it for retail shops and stores.

Highland lies north of Hillsdale. It is a small town, and formerly was an important stage station on the road from Lafayette to Terre Haute. At present it is a small residence village, using the railway station of West Montezuma for all commerce and travel. The latter station is only a flag stop for the Chicago and Eastern Illinois Railroad.

Dana.

Dana is located in the best farming district of Vermillion County, being surrounded by level prairie land which produces splendid farm crops of all kinds; corn, oats, clover and wheat are the chief ones. Dana makes a splendid market for the immediate vicinity, though grain elevators are located on the Southern Indiana Railroad, one being just a mile west of Dana, and another two miles south of the first. Thus, ample facilities are afforded the farmer to dispose of his products through the Chicago markets over the Southern Indiana railroad, and through the Indianapolis markets over the Cincinnati, Hamilton and Dayton railroad. The agricultural products are taken up more thoroughly under the soil-type topic.

This town with its 900 population is beautifully planned and makes a most desirable home. It operates its own lighting system, with night service only. The streets are of macadam and in addition are kept oiled during the summer season. Every lot is fronted by practically new cement walks, and uniform rows of shade trees, namely the maple species, give additional beauty to the street and property.

The school system is good, though the building is not fully modern. The business institutions are principally retail shops. The ice plant, elevators, feed mills and electric plant, give work to the laboring class, while the greater number of inhabitants have farms lying near, which furnish a source of income.

Toronto.

Toronto, or "Bono," three miles south of Dana, is one of the early county towns which has ceased growing because of the lack of a railroad. Nevertheless it is in a good locality and furnishes the people a ready access for provisional supplies. A splendid commissioned township high school is located at this place, built upon the consolidated type, and gives great advantage to the young people of the community for a thorough high school education.

Toronto has a population of fifty, most of its people being farmers, either owners or renters.

St. Bernice and Jones.

St. Bernice is located in the southwest part of Helt Township and has a population of about 150. Just east of this place is the older portion called Jones, or Jonestown. It is the older location, and was the only town in this part of the township until the Southern Indiana Railroad was built. The new part is located near the railroad and is now the commercial center for the two.

The elevator and lumber yards are the largest industries.

Newport.

This town lies upon the southern end of the Newport-Engene Terrace and south of Little Vermillion River. It is the county seat and has a population of about 800 which proves to be a busy and enterprising people. In 1913 its first brick street was built, extending from the railroad to the business section. The court house and grounds add to the beauty of the town. The southern part of the corporation lies upon the upland hills and in this part is the well-known "Newport Hill." Newport's chief industry is the extensive clay works of William Dee, a Chicago capitalist. Grain elevators, lumber and coal yards, and sawmills give work to the laboring people. This town is well lighted with night service of electricity from Cayuga.

Cayuga.

Cayuga, formerly Engene Station, has at present a population of more than 1,000. It is a young town and is busily engaged in building permanent improvements. Its industries are a flouring mill and grain elevator, brick works and electric light plant.

Eugene.

Eugene is but another example of how a railroad may kill or make a town. The Toledo, Chicago and Eastern Railroad built its line a little to the south of this village and there started up Cayuga.

In 1887 Eugene had a population of about 500 and its present population is placed at 300. The terrace here is a sandy soil, good for gardening. Good water lies only 18 to 25 feet below the surface. The principal business establishments have moved away, either to Cayuga or some other railroad town. Formerly the milldam north of Engene in the Vermillion River gave power for one of the busiest mills of its day. Engene was an early river port.

Perrysville.

Perrysvile, formerly the largest town in Vermillion County and one of the best early trade centers, is still the largest town of the northern township. It is located upon the terrace bluffs of the Wabash, which at this place approach the bank of the river.

The early trade of Perrysville was drawn for miles overland, as this village was one of the most enterprising river trading posts. Though the town has been improved by the modern methods of street and walk-building, yet, historically it remains an interesting place, where the quaint styles of architecture can be seen in its older buildings both for homes and shops.

Its present business institutions are principally retail shops. A good flouring mill and elevators furnish adequate markets for the crops. The school system is one of the best and includes the graded, common studies and high school work. The principal interest of the major portion of the inhabitants is in the farm lands, either owning them or controlling interests of cultivation and cropping.

Gessie.

Gessie is a village three miles northwest of Perryville, and located on the Chicago and Eastern Illinois Railroad. It has a population of about 250. This town is surrounded by splendid prairie land, that produces the best of farm crops. Gessie furnishes a good local market, and is able to offer the best prices, since over the Chicago and Eastern Illinois Railroad the Chicago markets can be reached within a few hours.

Rileysburg.

This town lies two miles northwest of Gessie and is a local grain market and trading center. It depends upon the good farming land which surrounds it for its commercial life. The Chicago and Eastern Illinois Railroad gives it ready access to the Chicago markets.

It has a population of about 30, most of its people being employed upon the farms or in occupations that are directly connected with farm operations.

Transportation Facilities.

Pioneer Days.—Before the construction of the Wabash canal and the railroads, or even before wagon roads had been provided the Wabash valley was the center of attraction and the Wabash River was the only means of transportation of products and supplies. The towns and villages along this river were thus made the centers of trade. All the adjoining region to the east in Indiana and to the west in Illinois was compelled to bring its produce to the Wabash River for transportation to New Orleans and other southern markets.

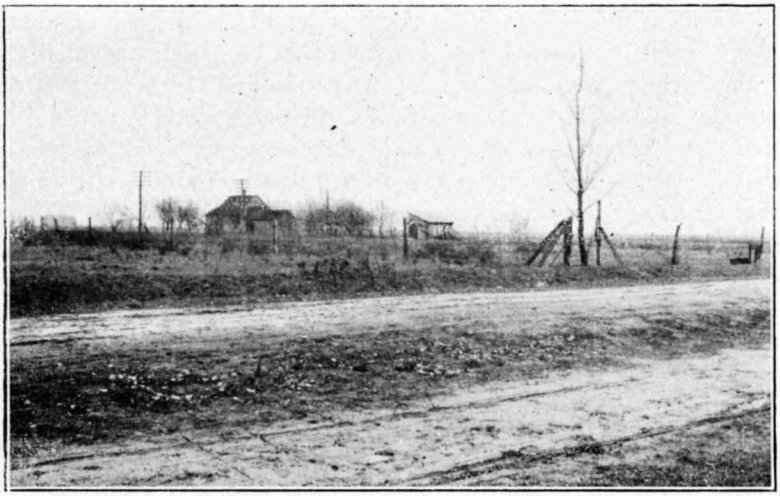
At first numerous flatboats of various sizes were loaded with pork, hogs, beef, cattle, corn, wheat, oats and hay and sent southward. Several hundred boats were often sent out of Big Vermillion River from Eugene and Danville in a single season, and often twenty to forty would pass Eugene in a single day during the spring months. The down-river trips were filled with attraction that lured the adventurous youth into the occupation of flatboat commerce. Clinton, Eugene and Perryville were the home of the early captains and each could relate thrilling experiences with the southern Indians and "Murrell's Gang."

The first steamboat made its appearance on the Wabash in 1820, and it was a great and much-talked-of event, creating much public excitement. The flatboats disappeared from the streams and the steamers became a common sight.

In a few years wagon roads were constructed and improved, leading from the river ports to the important settlements farther inland. This was followed by the building of the present railroads which furnish adequate facilities to better markets in the east, west, north and south.

Chicago and Eastern Illinois Railroad.—This railroad was the first to be completed in Vermillion County, being built in 1868-70.

The undertaking gave universal satisfaction to the people, though not to some of the villages along its line. It crossed the Wabash River at Clinton and followed it northward to Perryville, thence northwestward to Danville and Chicago. Being constructed in the interest of the Danville and Terre Haute trade, the local towns were not taken into account and from some of them it was located a mile or more away. Clinton received new life, but many of the smaller towns a short distance from the railroad suffered greatly. Eugene is an example of this sudden change of commercial development. Cayuga (Eugene Station) receives the trade and produce usually brought to Eugene, and now the former has become a thriving in-



Topography of the terraces south of Cayuga. At this place they are over three miles wide.

corporated town. The principal stations along the railroad line are, from the south to north, Clinton, Summit Grove, Hillsdale, Newport, Cayuga, Perrysville, Gessie and Rileysburg. Furnished coaches and adequate accommodations are made for long distance traveling. The local trains give good service to the small stations, making all stops mentioned above

The C. C. C. and St. Louis Railroad.—This railroad under the name of the Wabash was built in 1851-52, but it can scarcely be counted of any great benefit to Vermillion County as one of its railroads. It crosses the extreme northern sections of Highland Township, but makes no regular stops. Less than three miles of main track are in Vermillion County.

Cincinnati, Hamilton and Dayton Railroad.—This railway system crosses the county in the northern part of Helt Township and makes station stops at the junction of the Southern Indiana Railway, Dana, and Hillsdale. Nine and one-half miles of track lie in Vermillion County.

The above company operated this road until the summer of 1912, when it was taken over by the Baltimore and Ohio system.

The Cincinnati, Hamilton and Dayton Railroad is a direct line east to Indianapolis and west to Decatur, Illinois, and places the splendid farming region about Dana and the clay works at Hillsdale in easy access to eastern and western markets.

Toledo, St. Louis and Western Railroad.—This railroad is perhaps better known as the "Cloverleaf." It crosses the county in the southern part of Eugene Township and has eight and one-half miles of main track in the county. The junction of the "Cloverleaf" with the Chicago and Eastern Illinois Railroad is at Cayuga, which is the only station stop. The bridge over the Wabash is the longest on this road, having five spans of one hundred sixty feet each. In the western part of the county the steel trestle work over Vermillion River is a masterful structure, and one of the new improvements.

Southern Indiana Railroad.—The Southern Indiana, or Chicago, Terre Haute and Southeastern, is known as the "Walsh Road." It was built largely through the capital furnished by that noted capitalist of Chicago, John R. Walsh.

This line of railroad, in its course from Chicago to the great coal fields of Indiana runs through Danville and Terre Haute, and en route, it traverses the western part of Vermillion County, with a few stations, including Quakers, West Dana, St. Bernice, Scissorville and Jacksonville. It was projected and completed about 1905. It transports immense quantities of coal and grain. Seventeen miles of track are in this county.

All other railroads have good systems of passenger service throughout their entire lines, but only one train daily carries passengers over this road and it runs only between West Dana, the junction of the Cincinnati, Hamilton and Dayton with the Southern Indiana, and Terre Haute.

Terre Haute, Indianapolis and Eastern Traction Company.—The northern terminus of this electric system is at Clinton. Every hour during the day interurban cars run between Terre Haute and Clinton, making connections with the cars leaving for Indianapolis, Sullivan, and Paris, Illinois. This gives excellent and inexpensive

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passenger service. The best modern equipments are used on the limited service. The local accommodations are superior to many short line "runs". The electric railroad handles a great deal of the merchant freight for Clinton, especially that of the fruit and grocery dealers.

The Coal Mining Industry.

This is one of the greatest sources of revenue to the citizens of Vermillion County. The output is prolific and the revenues are large to the operators and people in general, yet the zenith of its development has not fully been reached in every territory. The five mining companies are operating seventeen separate mines and employing more than fifteen hundred men. One of the largest and most thoroughly modern collieries in the United States is located near Clinton, the Bunsen Coal Company, a subsidiary of the United States Steel Corporation. More than three and one-half million dollars are invested in this one plant for mining soft coal. Every modern safety appliance is used for the protection of its employes, while at work in the entries and rooms. The surface accommodations of bath rooms, dressing rooms, etc, are furnished in order to make the mining business enjoyable to everyone. The grounds are planned and cared for like a park. The buildings are of steel and cement. Many other machine mines at present are also equipped with all improved inventions and are able to increase the output immensely.

The table below shows the production of coal in Vermillion County as contrasted with the other great coal-bearing counties of Indiana in 1910. Accompanying the items of production this table also shows the wages paid.

County.	*Tons Mined in 1910.*	*Wages Paid in 1910.*
Sullivan	4,339,173	$3,703,122
Vigo	4,116,981	3,612,856
Greene	3,241,690	2,332,927
Vermillion	1,676,281	1,446,481
Knox	1,045,868	720,091
Clay	948,402	1,064,757
Parke	727,727	780,260
Warrick	701,390	559,108
Pike	599,952	485,978
Vanderburgh	369,987	295,534
Gibson	285,101	235,286
Daviess	72,692	70,986
Total	18,125,244	$15,527,390

The Norton Creek coal mines were among the first opened. They were developed and operated in the early eighties (1884). The company was incorporated under the Wisconsin laws but managed by local parties, Mr. C. P. Walker of Clinton being superintendent. The incorporation included a number of tenant houses, a general mercantile establishment and the mines. This was the beginning of the mining camp now known as Geneva. These mines at present are not operated and many of the buildings are empty.

The following table gives the names of the owners, the geological number of the different coal seams worked, the thickness of the seams, and the depth of the overlaying strata of the Vermillion County mines that are in operation.

Owner.	Name of Mine.	No. Geol. Strata.	Thickness of Seam.	Depth of Overlying Strata.	Railroad Transportation.
Clinton Coal Co.....	Crown Hill No. 1...	5	4 ft. 10 in.	165 feet.	C. & E. I.
Clinton Coal Co.....	Crown Hill No. 2...	5	4 ft. 10 in.	155 feet.	C. & E. I.
Clinton Coal Co.....	Crown Hill No. 3...	3	6 ft.	345 feet.	C. & E. I.
Clinton Coal Co.....	Crown Hill No. 4...	4	4 ft. 6 in.	249 feet.	C. & E. I.
Clinton Coal Co.....	Crown Hill No. 5...	5	5 ft.	182 feet.	S. I.
Clinton Coal Co.....	Crown Hill No. 6...	5	4 ft. 6 in.	190 feet.	S. I.
Oak Hill Coal Co.....	Oak Hill No. 1.....	3	6 ft. 2 in.	353 feet.	C. & E. I.
Oak Hill Coal Co.....	Oak Hill No. 2.....	5	4 ft. 8 in.	149 feet.	C. & E. I.
Oak Hill Coal Co.....	Oak Hill No. 5.....	4	4 ft. 6 in.	.....	C. & E. I.
Oak Hill Coal Co.....	Oak Hill No. 8.....	4	4 ft. 9 in.	.....	C. & E. I.
Oak Hill Coal Co.....	Buckeye No. 3.....	3	7 ft.	300 feet.	C. & E. I.
Oak Hill Coal Co.....	Buckeye No. 4.....	5	5 ft. 4 in.	.....	C. & E. I.
Whitcomb Coal Co.....	.....	5	5 ft.	.....	Wagon mine
Bunsen Coal Co.....	Universal No. 4....	4	4 ft. 10 in.	236 feet.	C. & E. I.
Bunsen Coal Co.....	Universal No. 5....	5	4 ft. 11 in.	165 feet.	C. & E. I.
Shirkey Coal Co.....	Twin Mines No. 1...	6	4 ft. 8 in.	.....	S. I.
Shirkey Coal Co.....	Twin Mines No. 2...	5	5 ft.	.....	S. I.

The following table gives the analysis of 100 pounds of Indiana coal on the basis of combustion.

	Combustible Matter (Pounds)	
Fixed carbon		43.
Volatile carbon	18.	
Available hydrogen	3.3	
Total combustible volatile matter.....		21.3
Sulphur		3.
Total combustible matter.....		67.3

	Non-combustible (Pounds)		
Ash		11.4	
Nitrogen	1.1		
Oxygen of water of constitution in gas	7.3		
Hydrogen of water of constitution in gas	.9		
Total inert volatile matter		9.3	
Oxygen in "moisture"	10.7		
Hydrogen in "moisture"	1.3		
Total "moisture"		12.	
Total non-combustible			32.7
Total coal			100.

Outcrops of coal are found around Perrysville and in wells west of that place. The Minshall coal outcrops along Coal Branch in Secs. 21 and 27, T. 18 N., R. 10 W., about five and one-half miles southwest of Perrysville. It is badly split up by partings and in 1913 only two drift mines were in operation. It outcrops again along Vermillion River just a short distance above Eugene, where it has been worked on both sides of the river.

Southwest of Cayuga one mile, coal has been mined at a depth of 80 feet. Along Little Vermillion River the strata of coal lies above the bed of the stream. Wagon mines are in operation in the bluff district one and three-fourths miles southeast of Newport. At Hillsdale it is met with in drillings. An old shaft one mile west of Dana passed through an eleven-foot vein at a depth of about 100 feet. The mine was abandoned. It was necessary to timber the entire roof since the overlying clay formation was not strong enough to furnish a workable roof. In Clinton Township the majority are shaft mines, working seams 3, 4 and 5. Though coal beds are found in nearly all parts of the county, mining is developed on an extensive scale only in the southern part.

Iron Mining.

Iron mining began in Vermillion County in 1839 and continued until 1893. When the hematite beds of Missouri, Tennessee and Georgia were opened it became unprofitable to work the bog iron ore and now none of the fourteen blast furnaces are in operation.

Clay Works of Vermillion County.

It is along the bluffs that border the river terraces that the largest and most available deposits of clay are exposed. The bluffs approach the river closely at Hillsdale and Newport and give added advantages for commercial development. The close proximity of the railway to the clay beds furnishes the necessary transportation facilities. Numerous plants for utilizing these deposits have been built along the bluffs, forming a line of clay-working establishments extending in Vermillion County from Clinton to Cayuga.

The plant farthest south is the Clinton Brick Company, which erected a large factory in 1893 for the manufacturing of vitrified brick from the shales, one and one-half miles northwest of Clinton. The plant now lies at the border of the incorporation of the city and utilizes the clay from the bluffs that lie only a few hundred yards west of the plant. At present this company is specializing in paving brick of excellent quality.

Just south of Hillsdale is a second large clay plant. It is operated by people of Parke County and works an exposure of shales and drift clays of over 100 feet exposure.

The third is situated in a ravine west of the station of West Montezuma, and works a section of very high quality. At the time of opening the section contained:

1. Soil and drift, 5 to 7 feet.
2. Sandstone, 2 to 10 feet.
3. Light gray arenaceous shale, 1 to 6 feet.
4. Coal, 3 to 5 feet, 6 inches.
5. Fire clay, 3 to 4 feet.
6. Blue to drab argillaceous shale, 25 to 30 feet.
7. Concretionary iron carbonate, two banks, 6 inches.
8. Black fissile shale, 2 to 3 feet.
9. Coal, 1 foot.
10. Fire clay (white silicious), 5 to 7 feet.
11. Blue and drab argillaceous shale, 42 feet.
12. Black fissile shale, 2 feet.
13. Coal, 1 foot and 8 inches.
14. Fire clay, 8 feet.

The workable clays of the above section aggregated 90 feet and the coal furnished suitable fuel. At present the section has changed in respect to the items numbered 1, 7, 9, 11 and 13. However, in its entirety the development has given a clear quality of

workable materials and a proof of a permanent supply for many years.

Lying only a short distance north of the latter plant is another. It is situated near the station of Worthy. In many respects in regard to location and supply of material this last plant is quite similar to the one near West Montezuma.

Mr. Dee of Chicago owns and operates the plant at Newport. This is one of the largest plants of the county which specializes in drain tile. The clay beds at this exposure are:

1. Soil and drift, 4 to 10 feet.
2. Arenaceous and fire clay shale, 25 to 40 feet. (The base is not exposed.)

The last plant of the line is situated one-half mile south and three-fourths mile west of Cayuga. The clay used is found 70 to 100 yards from the dry pans, and is hauled into the sheds by tram cars.

The section here is as follows:

1. Soil drift clay, 2 feet.
2. Shaly sandstone, 5 feet.
3. Drab arenaceous shale, 5 feet, 6 inches.
4. Blue arenaceous shale, 7 feet.
5. Fire clay (bottom concealed), 6 feet.

The clay tests chemically to be of low refractory power and burns into a buff front brick of handsome appearance.

The above is the most available deposits of commercial clays of Vermillion County. However, at other places along the Chicago and Eastern Illinois Railroad, the shale is mined and shipped to some point where it is utilized in manufacturing fire clay goods for refractory purposes in the construction of furnaces, crucibles, flues, and where heat resistance is sought.

Agricultural Interests.

Vermillion County has 90 to 95 per cent. of its area in farms and the major portion of this is tillable soil. The hilly portion comprises about 18 per cent. of the farms. It should be kept under permanent vegetation to prevent the erosion. The average value per acre ranges between $50 and $75. The prices of the separate types are given along with their description. The following table gives a few interesting facts for 1910:

Corn.—Acres, 44,934; bushels, 1,739,274.
Oats.—Acres, 18,857; bushels, 598,964.
Wheat.—Acres, 12,242; bushels, 238,455.
Clover Seed.—Bushels, 316.
Potatoes.—Acres, 361; bushels, 34,508.
Timothy.—Acres, 7,364; tons, 9,179.
Clover.—Acres, 1,534; tons, 1,730.

Alfalfa is being tried in several sections of the county, but the writer does not feel that the experimental stage is over and nothing definite could be given as to its permanency as an addi-

Topography of the Miami gravel-loam type. One mile west of Clinton.

tional crop for Vermillion County. Several small plots are doing well, but they are young, being only one or two years old. The dry season of 1913 was a severe test on the recently seeded tracts. However there is little doubt but that a portion of the county could be inoculated and grow thrifty crops of this plant.

Corn, oats, wheat and clover are the leading crops and they are spoken of in connection with the soil types.

Climate and Crop Notes.

The growing season in Vermillion County is amply long for the maturing of all staple crops of the temperate climate. The winters are seldom severe nor are the summers intensely hot. These ex-

treme ranges are shown in the following chart. The information for the chart was gathered at the United States Bureau Station of Climatology, located at Rockville, which is a short distance east of this county, but has, however, practically the same climatical changes.

ROCKVILLE.

Months.	Length Of Record.							
	Mean Monthly Precipitation, 22 Years.	Mean Temperature, Fahrenheit, 22 Years.	Maximum Temperature, F.° 22 Years.	Minimum Temperature, F.° 22 Years.	Average Snow Fall. 20 Years.	Average Number of Days with .01 Inch Precipitation. 21 Yrs.	Average Date Killing Frost, 16 Years.	Date of Killing Frost, 16 Years.
January	2.5	28	69	-15	4.5	8	.....	.....
February	2.4	28.6	69	-22	4.8	8	.....	.....
March	3.6	40.4	85	-3	3.6	10	.....	.....
April	3.4	52.4	88	19	.2	10	Last in Spring April 27.	.....
May	4.21	62.4	96	28	Trace.	12	Latest in Spring, May 28.	.....
June	4.15	71.2	100	34	0	11	.....	.....
July	3.25	74.8	104	43	0	9	.....	.....
August	2.88	73.0	101	40	0	7	.....	.....
September	2.92	67.3	103	26	0	6	.....	Earliest in autumn, Sept. 13.
October	2.27	54.6	92	18	Trace.	7	First in autumn, Oct. 7.	.....
November	3.50	41.8	75	2	.7	8	.....	.....
December	2.56	32.1	76	-12	2.4	8	.....	.....
Annual	37.68	52.2	104	-22	16.2	104	.....	.....

The western part of the county, notwithstanding its narrowness, has a greater variation of temperature than the eastern. This is affected by the proximity of the Chicago prairie, over which the winds, coming from the west, may pass without much deflection. Then also the Wabash River has a tendency to equalize the temperature ranges of the valley country in the eastern portion.

Abundant precipitation falls during the spring and summer months to insure adequate moisture for the seeding and growing seasons.

In reference to corn the seeding is done in the early part of the month of May, the definiteness of time being governed by the variability of the season changes and the moisture condition. The growing season extends over the summer months. The crop matures in the month of September.

Winter wheat is usually sown from the 10th to the 20th of Sep-

tember. However, wheat that has been sown in October generally gets sufficient growth. The land sown in wheat should be visited by a killing frost a few weeks after the wheat comes through the ground in order to insure its safety of becoming infected with the "fly" or other noxious insects.

Oats are sown upon "corn stubble" field or "fallow" ground as soon as the freeze is out of the ground and it becomes sufficiently dry to work. The exact date for this seeding ranges greatly, due principally to the amount of moisture and late freezes. Usually, however, the fields are prepared and seeded during the first weeks of April and occasionally during the last of March.

The harvesting of the wheat and oats follow each other in succession during the month of July.

Drainage.—The drainage of Vermillion County is made very simple since the Wabash forms the eastern boundary. No point of Vermillion County is more than 10 miles from this river. All principal streams flow to the southeastward and empty into the Wabash. The larger streams named from north to south are as follows: Spring Creek, Vermillion River, Little Vermillion River, Norton Creek, Brouilette Creek. Vermillion River was used for power during the early days, being employed in turning a water wheel at an old mill which formerly stood near where the Eugene bridge now spans that stream.

The first and second divisions of the county according to the topographical features, spoken of in a former paper in this report, are well drained. The latter is seldom tiled, being the rolling Miami series, and constituting the previously forested area of the county. The level portions of the upland should be drained artificially, which would assist in removing the sourness of these soils.

In the prairie districts artificial drainage must be depended upon altogether. The surface is flat with a gentle slope to the southwest. Artificial open ditches drain the lower portions and tile drains lead from these. These prairie soils should be well drained to prevent stagnation of the water in the soil and produce a condition that is commonly known as "alkaline." In Vermillion County only a very small area is affected thus, which can be corrected by drainage alone. For the most part the prairies are well improved and owned by people who know that improvements and care of the soil are good investments.

The Liming of Soils.—The recognition of the agricultural value of certain forms of lime is not new. It has been used for soil im-

provement since the beginning of agricultural history. In England, Germany, France and other European countries the application of lime in various forms has been and still is used extensively. Lime together with some phosphate usually causes a complete change in the poorest of soils, so that for a time cultivated crops do well. The early lime fertilizers were the native deposits of chalk or marl, though very finely ground limestone or thoroughly air-slacked lime are more available and are practically identical to the first two so far as the calcium carbonate is concerned as a constituent. It makes no difference what form of limestone is applied to the soil the subsequent benefit during the following months or years is due to the same slacked lime or calcium carbonate.

These facts alone favor the use of good natural limestone ground to a fine flour.

The burnt lime or caustic lime stimulates the soil, destroys its texture and eats away the available foods of the soil by chemical action. The crops following such an application of fertilizer may be better than the previous ones, yet the depletion of the soil does not approve of such stimulation and eventually the production becomes unprofitable and the soil practically barren. The action of burnt lime, or quick lime upon one's hand is sufficiently familiar to all and shows its method of attack upon organic substances in the soil.

For further enrichment of the soil, it is necessary that the legume is grown. These, cowpeas, soybean, clover, alfalfa and vetch will not grow well upon acid soils. Lime is very desirable to sweeten the sour soils and to assist the growth of the root-tubercle bacteria. Farm manure or other fertilizers will make it possible for the legume plants to grow, but the development of the bacteria is retarded because of the acid soil.

The effects of liming land are due to two distinct chemical properties: first, to its basic property in neutralizing the acidity of the soil and making it possible to grow plants whose roots are the homes of nitrogen-gathering bacteria and bring the nitrogen from the air into an available form of plant food; second, to its caustic properties, lime decomposes and destroys the humus and liberates and reduces the stock of plant food stored in the soil. The last effect of lime upon soils may be used to an advantage upon peaty deposits in order to hasten the process of decay, but yet in such reaction of caustic lime the nitrogenous plant foods are liberated and escape from the soil.

The following experiment shows the different reports of different kinds of lime.

The experimental field was on a farm tilled for seventy-five years with careless management.

	Produce in Eleven Years.		
Kinds of Lime Used	Corn (bu.) 4 crops.	Wheat (bu.) 3 crops.	Hays (tons) 4 crops.
None	98	32	2.6
Quick lime from stone	128	32	3.09
Quick lime from shells	129	34	3.82
Lime as ground shells	148	42	3.97
Lime as shell marl or well slacked lime or powdered limestone	145	43	4.29

In the case of using limestone the magnesium limestone should be discarded. The magnesium carbonate contained in such stone proves injurious to the roots of plants. A method of differentiating it from the purer limestone may be made by noting the fact that it is heavier than the limestone and will not effervesce vigorously when cold hydrochloric (muratic) acid is dropped upon its surface. On the contrary pure calcium carbonate decomposes vigorously when an acid is applied.

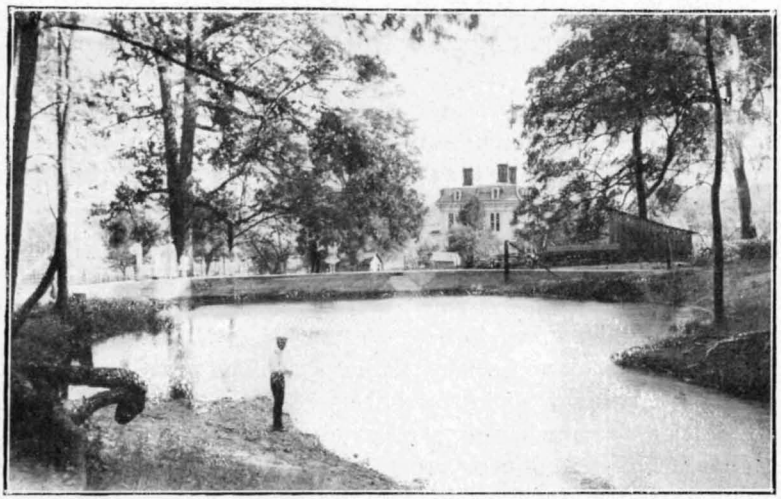
The frequency with which liming should be practiced depends, among other things, upon the character of the soil and the rate of application, the number of years involved, in the rotation practiced, the plants grown and their order of succession. As a general rule, it may be stated that from one-half to one and one-half tons of lime per acre every five or six years is sufficient. Applications of two or three tons may, however, be advisable in case of very acid soils which are to be seeded down and to remain in grass for several years. The practice of applying small amounts of lime at somewhat frequent intervals is being generally accepted as preferable to the use of large amounts at rare intervals.

Lime in the form of carbonate of lime (limestone) or marl can be applied in the spring or at any season of the year, but the autumn is always the safest time to apply the caustic or slacked lime. It is generally considered best to apply the lime to the soil immediately after plowing, and harrow in thoroughly. Lime which is already slacked may be spread upon the soil directly from wagons or by the use of a lime spreader or fertilizer attachment. Burnt (quick) lime should be well slacked before spread upon the soil

Gas-house lime, if used at all, should be weathered for some time in the open air before it is incorporated with the soil. The sulphur compounds which it contains are injurious to plants.

Lime alone should not be depended upon to maintain the fertility of the soil, for all of the ingredients which plants need must be present in the soil to insure the profitable production of crops.

Late Crops.—On nearly all farms every year are a few acres of spare ground that can be profitably planted in some late crop. Several good crops for late feed can be planted from the first to the middle of July if there is ground to spare and everything is in



One of Vermillion County's modern country homes. Private water-supply lake for the general farm use, and home conveniences.

readiness when spare times comes for the work. One advantage in the late crop is that the weather is warm and favorable for rapid growth and early maturity.

One of the good late crops that can be planted in midsummer is cowpeas, which may go into the ground any time from the first weeks of June till the last weeks of July. The crop planted in midsummer with favorable soil conditions will mature in from eight to ten weeks, and be ready for harvest and storage before frost. Millet may be planted either with the cowpeas or separately, maturing in about the same length of time. Land intended for fall seeding of wheat, rye or grass may be planted in cowpeas in the middle of the summer, and the seed or grain drilled in the field as soon as the

crop of peas is harvested. This will save one plowing and the extra working of the soil for fall seeding.

Standard maturing or large sweet corn, also early maturing varieties of standard field corn, can be planted in midsummer and make the best of fodder for late fall feeding. If frost is late much good sound corn will be secured. A few acres of this late corn will produce enough good fodder for a large number of animals for several weeks, thus saving hay and grain in storage. It can be planted and tended with scarcely missing the time.

Sorghum and Kaffir corn are other good crops for mid or late summer planting. On good ground these crops grow wonderfully fast after once making a start and they will yield immense amounts of succulent green fodder for fall and early winter feeding. Both are excellent drought-resisting crops, yet they grow extremely fast and thick under the stimulus of the late summer or early fall rains.

Of the taller growing plants, as a rule, the best general results will be secured by planting the spare ground in sweet corn in the middle of the summer. In the planting of a few acres of sweet corn or some variety of very early maturing field corn, the regular corn crop may be saved for later feeding or for marketing. Corn has now risen to such good prices that it is well to save this valuable crop as much as possible for marketing some of the grain for cash, unless plenty of animals are kept on the farm to consume it. The late planted sweet corn for home use will make practically as much good feed as the early planted standard field corn, acre for acre, and in this way will be of as much value as the early corn. Sweet corn, using all the plant when just past the roasting ear stage, makes the best kind of feed and with it stock will do well.

Where one has either a large or small patch of early potatoes, early maturing corn may be planted between the rows at the last cultivation of the potatoes and the crop will mature for good home feeding before frost. If the potato field is clean and the vines do not cover all the ground between the rows the corn will come up and grow very fast with scarcely any cultivation. If the potatoes are dug and marketed early the corn may be cultivated to advantage after the potatoes are out of the way.

Vetch.—Along with cowpeas and soybeans, another legume that is attracting considerable attention just now is vetch. This plant has been known and cultivated in the old world from time immemorial, and for the last few years has been grown in various parts of this country.

There are two varieties among the cultivated forms, the summer and winter types. The former is sown in the spring and harvested late in the summer, while the latter being perfectly hardy, is usually sown in the fall and harvested the summer following. The latter variety is as hardy and cold-resisting as wheat or rye, with which it is usually sown, and affords pasturage during the winter and early spring when nothing else is available. Even during the heavy snows of our northern winters, the green tops project above the snow and are greedily eaten by all kinds of stock.

The various experiment stations throughout the country have been experimenting with this plant for several years and recommend the winter variety for sowing with rye as a pasture and soiling crop, and as a green manuring crop, to plow under the following spring.

As a soil renovator, the plant has few equals, since it will grow on the poorest of soils, preventing washing and leaching during the rainy seasons, and makes a rank growth to plow under in the spring.

The vetch belongs to the same family of plants as the pea and clover, resembling the former in its habits of growth and general appearance. It grows about three feet high ordinarily, although occasionally on good soil it reaches a height of five or six feet. Some plants have been found growing with oats and field peas in central Indiana recently, fully five feet in length.

The seeds or peas are smaller than the field peas and are black in color, resembling somewhat the seed of sweet peas.

It makes an excellent hay when grown with wheat or rye to hold the plant up, but its rank growth and vining habits unfit it for a hay crop when grown alone. Probably its greatest value will be found as a pasture crop with rye and as a green manure crop to plow under to add humus to the soil.

The greatest drawback at present is the scarcity and high price of the seed, but a small plot will furnish enough seed for several acres, and when more generally grown this difficulty will be overcome.

The Michigan Experiment Station reports a considerable acreage grown in that State and in every case the plant withstood the winters perfectly and furnished abundant winter and spring pasturage.

The time has come when legumes of some kind must be grown, not only for pasturage and hay, but for the beneficial effects on the

soil, and winter vetch is one that will fit in perfectly with the small plots of rye sown every year, and will assist in maintaining soil fertility and return a profit at the same time.

We cannot always continue to take from the soil, unless we put something back into the soil from which to draw. Fertility is limited, and like a bank account, it must be replenished or a time will come when our drafts will not be honored. For this purpose legumes must and will be grown.

SOILS.

MIAMI SERIES.

The soils known as the Miami series consist of three types; namely, Miami Silt Loam, Miami Gravelly Loam and Miami Loam. They comprise the upland soils and in Vermillion County the forest lands. Often phases of these series are locally known as "sugar tree land," and in the virgin state is a productive soil. The general color ranges from a pale gray to dark gray and the texture of the surface is fine powdery silt to a loamy silt with coarse gravel. The Miami soils are the best blue grass lands of Vermillion County. The level portions make splendid farms, producing profitable crops of wheat, corn and oats. The quality of the Miami types of soil for fruit raising cannot be excelled by any other type of soil in the county. A number of large orchards and vineyards show what possibilities these types offer the horticulturist.

The areas of the Miami Series are given in the following table:

MIAMI SERIES.

Types.	*Areas.*
Miami Silt Loam	75 square miles
Miami Gravelly Loam	55 square miles
Miami Loam	3 square miles
Total of Miami Series	133 square miles

Miami Silt Loam.

As found in Vermillion County the surface soil of the Miami silt loam to the depth of 8 to 12 inches consists of a grayish to yellowish brown silt loam. This is underlaid by a yellowish silty clay loam to a depth of 18 to 20 inches, where a yellowish brown gritty clay loam is encountered, to dark plastic clay. The soil and subsoil have a dense, close structure, as well as a fine texture.

In the southern part of the county the soil is not quite so silty as elsewhere; the subsoil is somewhat heavier and contains more clay than the type as a whole.

In the central township where the individual tracts are large the soil is very floury in appearance, being very silty and of a whitish color. These areas are rather low in organic matter and less productive than the same types farther north in this county. The Miami silt loam is an easier soil to cultivate than the clay loams and can be worked under a wider range of moisture conditions. Cultivation when wet causes some baking and clodding, and of

One of Vermillion County's big springs improved for public service. A favorite spot on the Perrysville-Covington road.

course this should be avoided as much as possible. The physical character of this soil is such that good mulch can be kept on the surface by judicious cultivation and a very loose and mellow seed bed secured. The Miami silt loam is one of the most extensive and important types in the county. It extends from the northern to the southern boundary in isolated tracts associated with other types of the Miami series. The topography varies from level to gently undulating. In places it is rolling and especially near the division of this type with the more hilly Miami gravel-loam. On the more rolling portions a sod of some grass or clover should be maintained to prevent or at least decrease the surface wash and possibilities of gullying. Fall plowing for spring tillage is inadvisable, as the

surface then puddles and makes the preparation of a seed bed almost impossible without replowing. Also leaching of the soil by the percolating water of the winter rains, and the possibilities of gullying are greatly increased. The rains during the seeding season cause a compact crusting upon the surface which often prevents a good stand of intertillage crops even when the proper care has been taken in all other preparatory necessities.

The fine structure and texture of the Miami silt loam makes under drainage inadequate. The narrow land dead furrows are used as shallow surface drainage ditches. Artificial drainage of numerous tiled ditches paralleling each other only a few yards apart would give immediate evidence that the soil had been benefited by the removal of the stagnant underground water that contains a great per cent of the soluble acid constituent of the soil, and give means for better aeration. Liming the land is an immediate remedy for "sour soils"; however, it does not increase measurably the needed plant food. The calcium would be added in excess and react with the acid to transform perhaps the hydrogen into available compounds though the much needed potash and phosphorous elements would be lacking in sufficient abundance.

The removal of the excess ground water would lengthen the period of cultivation and give opportunity for more thorough tillage methods, and consequently better control the moisture conditions in time of drought as well as in times of excessive rainfall. The original forest of beech, oak, hickory, maple, walnut, etc., have been mostly cut away and leaving the type "cleared" for cultivation. The Miami silt loam is especially adapted to the production of hay, yielding from one to two and one-half tons per acre. The best yielding fields are sown in a mixture of clover and timothy. After the meadow has been cut over from two to four seasons the sod should be harrowed and reseeded without plowing, or a rotation of crops to corn and clover would be beneficial to the soil, rolling the meadows in the early spring as soon as the ground is firm enough to enter upon with the necessary tools.

Even though this soil cannot be called a "corn soil" in its natural state, excellent crops of this grain have been produced upon the more improved portions. The average yield, however, is not over 30 to 40 bushels to the acre. Oats usually yield about 40 bushels per acre. The better managed portions of the Miami silt loam yield from 60 to 80 bushels of corn, oats from 40 to 50 bushels, and hay seldom less than two tons per acre,

The farming practices upon this soil are not as good as they should be. More organic matter should be introduced into the soil either by green manuring or by utilizing the refuse of the stables. This would improve the soil as to its ability to hold moisture and make the structure easier to manage in preparing for seeding.

Careful restriction of the soil to those crops for which it is adapted will also tend to make farming upon it safer and more profitable. The value of this type ranges from $30 to $60 an acre in the poorer condition to $75 to $100 for the well improved portion.

The following is the table showing the mechanical analysis of the Miami silt loam.

MIAMI SILT LOAM FROM SECTION 21, T. 19 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–10	1.2	5.4	11.4	13.4	18.5	31.4	18.7
Subsoil	10–30	2.4	7.1	14.3	15.5	11.5	24.6	24.6

Miami Gravel Loam.

The Miami gravel loam as found in Vermillion County is subject to considerable variation. The greater part of it occurs in Clinton and Eugene townships and differs in composition, according to the contiguity of large areas of the Miami silt loam type from which the soil of the former receives the surface wash, and any lodgment would locally cause noticeable variation in the composition chemically and physically. The most extensive areas of this type are a light brown to yellow gravel loam containing a great amount of silt. The clay constituent of the soil is heavy wherever it becomes thin and the coarse gravelly subsoil contains a heavy per cent of clay even to such an extent that it is used in the clay works along with the Merom shales upon which it lies.

The underlying shales have but little to do in influencing the chemical variation of the Miami gravel loam. The clay industries are located along the eastern bluff line of this type where the shales often outcrop in ravines and steep hillsides. Some difficulty is experienced in cultivating where the gravel is too close to the surface or where the topography is too rough and broken. The gravelly nature of the subsoil makes the type somewhat unretentive of moisture. The clays of the soil produce a firm crust that increases

the amount of "run off" to such an extent that gullying is a characteristic feature of this type.

The areas of the Miami gravel loam in Vermillion County are in the forest district spoken of in a former part of this paper. The heavier phase occurs in the central part of the county, closely associated with the Miami silt loam, and the lighter phase in the southern part in the coal fields. The attention paid to the coal production greatly tends to the neglect of the agriculture development. The coal proves far more remunerative than the soil, but encouragement should be given to the development of the latter in order to gain the greatest income possible.

The Miami gravel loam is splendidly adapted to fruit raising. Orchards, if not extensive, should be found on every farm as an additional source of food and income. The orchards grow well upon the slopes too steep for advantageous tilling. Vineyards are found in the southern part of the county growing upon this type of soil. "Mulching" and stable manure are used in protecting the roots of the vines in winter and it also serves to invigorate the growth in the spring. Other fertilizers are scarcely ever used. Clover makes the best orchard sod where it is possible to get it started. The steepness of the slopes and the readiness of the soil to wash makes the seeding difficult.

Where large areas of this hillocky land is owned by one farmer it is profitably given over to the production of pasturage for cattle and sheep. The number of sheep in the county is limited to a few flocks. On dairying farms the Miami gravel loam is used for permanent pastures. The price of the land ranges from $20 to $50 an acre. The following table gives the mechanical analysis of the Miami gravel loam:

MIAMI GRAVEL LOAM, FROM SECTION 16, T. 14 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–6	0.0	0.0	6.9	9.0	17.4	28.9	37.8
Subsoil	6–30	3.6	3.7	10.3	22.4	19.5	10.5	40.0

Miami Loam.

The surface soil of the Miami clay loam consists of a brownish-gray silty loam or silty clay loam 8 to 10 inches deep, underlaid

by a yellowish brown clay, which at 24 inches grades into a stiff, tenaceous chocolate-brown gravelly clay. The depth of the surface soil is variable, as erosion has removed from some of the higher elevations the silty covering which has accumulated on the lower slopes to a considerable depth. The surface of the Miami loam is more silty in the southern deposits than elsewhere. There are also a few shallow beds of gravel found in portions of this type.

The Miami loam has a rolling to hilly topography and is used principally for pasture and woodland. However, the leveler tracts respond readily to tillage and produce good yields of corn and truck crops.

The Miami loam is derived largely from the weathering of glacial till, and the surface wash from the higher phases of the Miami series. Though it appears along streams adjacent to the Genesee series, it is derived directly from the glacial debris instead of alluvial deposition, yet a portion may be the product of high water sedimentation. In many places one might suppose that the Miami loam occupied a second or third terrace; however, the deviation disproves this classification, and allying it to the silt loam types of the same glacial and loessial deposition.

MARSHALL SERIES.

In the type list on the map the next series shown is the Marshall. This one is composed of two types, namely, the Marshall black clay loam, and the Marshall silt loam. These two types are found in the prairie districts of the county about Dana in Helt Township and in the northwestern part of Highland Township. The best farm lands of the county are composed of these soils. Corn, wheat, oats and clover are the principal crops.

The topography is gently rolling to flat and also in the absence of native trees the area has a typical prairie appearence.

The area of this series is shown by the following table:

MARSHALL SERIES.

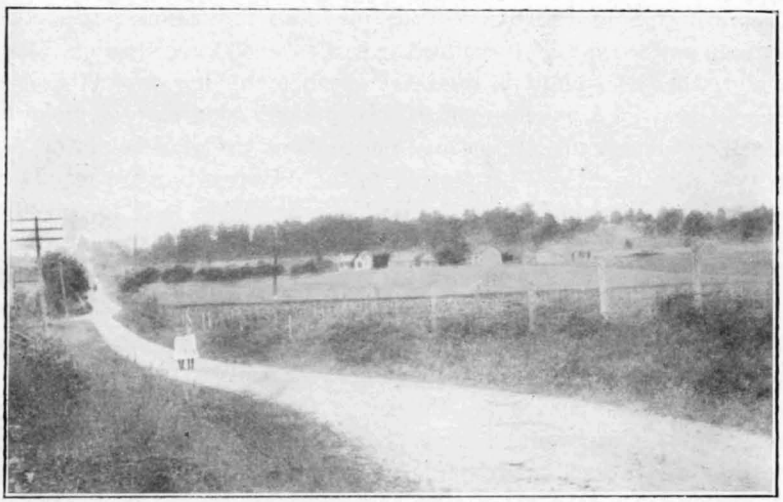
Types.	*Areas.*
Marshall Black Clay Loam	26 square miles
Marshall Silt Loam	12 square miles
Total of Marshall series	38 square miles

Marshall Black Clay Loam.

The Marshall black clay loam of Vermillion County makes up the greater portion of the prairie region about Dana and Gessie.

This is a dark brown to black loam, 10 to 14 inches deep and rests on lighter colored subsoil mottled with yellow streaks and spots of iron stains. The deep subsoil consists of a clay mixed with some sand and gravel. Glacier boulders are found occasionally. The type occupies a gently undulating to rolling country and covers a wide area in the prairie region.

While extensive areas of this type are well drained there are other areas where depressions unfit it for cultivation without arti-



The terraces in the foreground. The upland bluff line at the horizon. One-half mile west of Perrysville.

ficial drainages. Southwest of Dana the type lies in a depressed area and is drained by a shallow open ditch. North and west of Dana the Marshall black clay loam lies so flat that drainage is very difficult, though the artificial drainage employed removes without much delay the excess of water. A few bogs, ponds and swampy depressions remain yet to be drained. Notwithstanding the above difficulties, the methods of improvement of tillage and drainage have made this type one of the best farming districts of Vermillion County. In fact the prairie district is the prize farming region of the county. Wheat, oats, corn and clover are the principal crops.

The corn yields from 65 to 100 bushels per acre; the oats from

40 to 60 bushels, and wheat from 15 to 30 bushels. The maximum and minimum amounts are controlled by the method of tillage and previous care that has been given to the land. Though the land has not been more than a score and a half years under tillage many fields that have received no crop rotation are showing signs of decrease in production. In endeavoring to turn every product of the fields into money the tillers of the soil, many times disinterested in the future of the farms, have robbed the soil of every vestige that was salable. The soil is limited in fertility especially in a few important plant foods, as phosphorus and potassium, and these with o her organic producing elements must be returned to the soil. The best extensive method of returning the majority of these foods is by crop rotation in which a legume plays an important part. The legume assits rapidly to bring the soil to a better condition, especially when the plant is used for green manuring as well as the benefit derived from its roots. This method takes several years to reach the maximum of fertility desired but the movement for the best is permanent. With fertilizers the progress is more rapid; it works as a stimulant as well as adding available food to the soil. A little commercial fertilizer must be added to replace the lost foods that have been taken from the soil by the plants. These would be principally potash and phosphates. If, however, the full utilization is made of the solid and liquid manures of the stables, scarcely any fertilizer at all need be used on such soils as we have in the Marshall black clay loam. The soil is not sour to an injurious extent, but liming would benefit the soil if added in the form described under that head in this paper.

The value of the Marshall black clay loam ranges from $125 to $200 per acre. The improvement in regard to the buildings and fences are excellent. The region stands first in the county in reference to its beautiful country homes and ample storage barns.

The following table gives the mechanical analysis of the Marshall black clay loam:

MARSHALL BLACK LOAM, FROM SECTION 35, T. 16 N., R. 10 W.

Description.	Depth, Inches.	Gravel, Per Cent	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-12	.....	3.1	10.4	18.4	19.7	27.8	20.6
Subsoil	12-30	5.4	4.3	15.6	15.2	17.6	20.4	21.3

Marshall Silt Loam.

Marshall silt loam is found along with the Marshall black loam and possesses some of the general characteristics of the latter.

The type consists of a dark brown silt loam rich in organic matter. It ranges in depth from 10 to 15 inches. The subsoil is a light colored, mottled, silty loam or silty clay.

The drainage is usually good, but artificial drainage cannot be dispensed with altogether in order to get the best results. The topography is level to rolling and appears as broad low hillocks upon the Marshall black clay loam type. The subsoil, retaining moisture well, assists in resisting droughts to a marked degree.

The Marshall silt loam is without doubt one of the most important corn soils in the county. Oats are an important crop, always making splendid yields notwithstanding the variations in weather conditions. In other districts it has proven a valuable soil for the production of alfalfa and sugar beets, and is well adapted to late crops of pears and apples for winter market. Pastures of clover or bluegrass make good "runs" for beef or dairy cattle, and in a few localities it is used for that purpose.

The Marshall silt loam is a soil well adapted to intensive farming. Vegetables for fall and winter market are grown and many other canning products, as tomatoes and sweet corn, yield successfully.

The soil covering, as it does approximately two-fifths of the area of Vermillion County, has been an active figure in bringing about the splendid improvements of that district.

The valuation of the Marshall silt loam ranges from $100 to $200 per acre.

The following is the table showing the mechanical analysis of the Marshall silt loam:

MARSHALL SILT LOAM, FROM SECTION 35, T. 16 N., R. 10 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–12	3.6	1.8	6.1	15.1	25.2	30.8	17.4
Subsoil	12–30	1.6	3.1	4.5	18.2	21.4	27.1	25.1

WABASH SERIES.

The first bottom lands of the Wabash River are classed as the Wabash series. The two types that come under it are the Wabash fine sandy loam and the Wabash loam. Both are river deposits and lie below the high waters of the river. These floods usually come annually, but seldom cover the whole area. The silt deposits during this time tend greatly to enrich the bottom lands so that the continual cropping of corn has but little effect upon the apparent fertility of the soil. Corn and oats are the principal crops upon these types and the former does exceedingly well. The high waters of the spring season do not permit the sowing of winter crops of wheat. The flood either covers or kills the wheat and in places washes it away. The oats are used as a nurse crop for clover, wherever the bottom is not subject to direct wash. Clover grows splendidly upon the Wabash series if not too sandy and subject to too frequent overflow.

The following table gives the area of the Wabash series:

WABASH SERIES.

Types.	*Areas.*
Wabash Fine Sandy Loam	10 square miles
Wabash Loam	11 square miles
Total of Wabash Series	21 square miles

Wabash Fine Sandy Loam.

The Wabash fine sandy loam is a type of the first bottom land along the Wabash River. It extends in a narrow strip along the entire eastern border of the county. It lies adjacent to the river as is shown by the legion of small circles which is used as the differentiative feature upon the map.

It is a light-brown fine sandy loam 10 to 20 inches deep and containing a good proportion of clean fine sand. The subsoil is brownish yellow sand containing only a small per cent of clay and a great amount of coarse sand. This furnishes splendid underdrainage. The entire type is subject to overflow. Artificial drainage is seldom used, since the tiles soon fill with the sandy loam and are useless as underground watercourses. Corn is practically the only crop save small tracts used for trucking in the raising of melons, sweet potatoes and cabbage.

The annual inundation furnishes a new covering of silt soil which acts as a fertilizer and gives the Wabash fine sandy loam almost a permanent fertility.

The more sandy portions suffer from drouth during the weeks of slight rainfall. The corn if "earing" at such a time yields only a stinted ear and ripens or dies early.

The value of this soil ranges between $60 and $100 an acre.

The following table shows the mechanical analysis of the Wabash fine sandy loam.

WABASH FINE SANDY LOAM, FROM SECTION 10. T. 14 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-16	0.5	2.2	4.1	15.9	55.7	8.8	12.8
Subsoil	16-36	3.1	6.1	8.7	15.8	47.1	8.2	11.0

Wabash Loam.

The Wabash loam consists of a dark-brown to a black sandy loam of rather coarse texture and extends to the depth of 10 to 14 inches. The subsoil is similar in color to the soil save being a shade lighter because a slight deficiency in organic material. Farther back from the Wabash fine silt loam the Wabash loam has a lighter appearance.

This type lies adjacent to the Wabash fine sandy loam and is almost continuous throughout the extent of the county. The terrace approaches closely to the river at Clinton, Worthy and Perrysville for its formation. In those places the Sioux series and the Wabash fine sandy loam lie adjacent.

The Wabash loam is one of the best bottom lands for corn, raising from 60 to 80 bushels per acre.

The type is covered by the overflow partly if not wholly sometime during every year. This makes it unprofitable to try winter crops as great portions of them would be buried in silt or washed away.

In the lower portions of this type where the water of inundation remains longer than elsewhere, tile drainage is advisable though in every case it would not be profitable, as the outlet of artificial ditches would necessarily cross the Wabash fine sandy loam, at which place the fine sand would soon obstruct the openings and make the labor of tiling useless. Very little of any fertilizer has been used upon this soil. The higher places respond readily to barnyard manure and in those places alone will the full benefit of it be derived as the overflowing water that covers the lower

portions will carry with it a great deal of the available plant food given the ground by the addition of the manure.

The value of the Wabash loam ranges from $75 to $125 per acre. The following is a table showing the mechanical analysis of the Wabash loam:

WABASH LOAM, FROM SECTION 10, T. 17 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–14	.....	2.6	6.6	10.2	19.7	35.8	25.1
Subsoil	0–30	1.4	3.7	11.2	20.4	30.6	32.6	30.1

Coloma Sands.

The area of Coloma sands in Vermillion County is very limited, being only about one square mile. The greatest area is located Sec. 28, N. W. of Eugene and has a rolling topography. The soil is a sandy loam of grayish color containing a heavy per cent of silt loam. The subsoil is of a more reddish yellow, heavy sandy loam of coarser quality. In cuts along a road traversing this type of soil, that had been recently graveled, is exposed a layer of heavy plastic bowlder clay that contains a great amount of gravel and locally merges into gravel substratum. This lower substratum assists in the underdrainage, and in occasions of a few weeks of slight rainfall is even a detriment to the crop yield. This soil is moderately well suited to sugar beets and other trucking crops. Corn, oats, wheat and potatoes give fair yields, especially during a year of regular precipitation. Green manuring should be practiced in order to maintain a proper supply of organic matter. Clover of the deep rooted alfalfa species will be difficult to start upon such a soil; nevertheless, it is proving a good crop when once the spike root reaches to the stratum of permanent moisture. This soil lacks sufficient phosphorus, potassium and nitrogenous compounds, which have been removed more speedily from this soil because of its loose texture and hillocky topography.

Waverly Loam.

The Waverly loam is limited to about one square mile and occurs as first bottom lands along the smaller streams, near the point where they enter the bottom lands of the Wabash River. It

contains some organic substance but not sufficient to give it a black color. In many places it has been leached to a pale whitish soil and apparently has the character of a "water logged" soil. The soil is principally alluvial and often of great depths. It is often quite difficult to determine the division between the soil and subsoil. In color they are alike, and the latter contains more clay and fine gravel than the former. The soil depth ranges from 6 to 8 inches; however, it is not unusual to find areas much deeper. In the subsoil local strata of gravel are found.

Trees that thrive in a wet soil cover this type, namely, the sycamore, willow, soft-maple, water beech, etc. The topography is level, though a portion is somewhat slightly rolling. Open ditches are provided for adequate drainage. Some parts are subject to overflows during the rainy season.

When this type is thoroughly drained and protected from overflows it proves to be a good corn, wheat and forage land. Good meadows occasionally are found upon the higher portions of this type. Truck cropping with cabbage and onions does well, but this soil is not well adapted to tomato raising for canning purposes. The dry rot attacks the tomato before ripening and the blight stunts the plant, preventing it from blossoming.

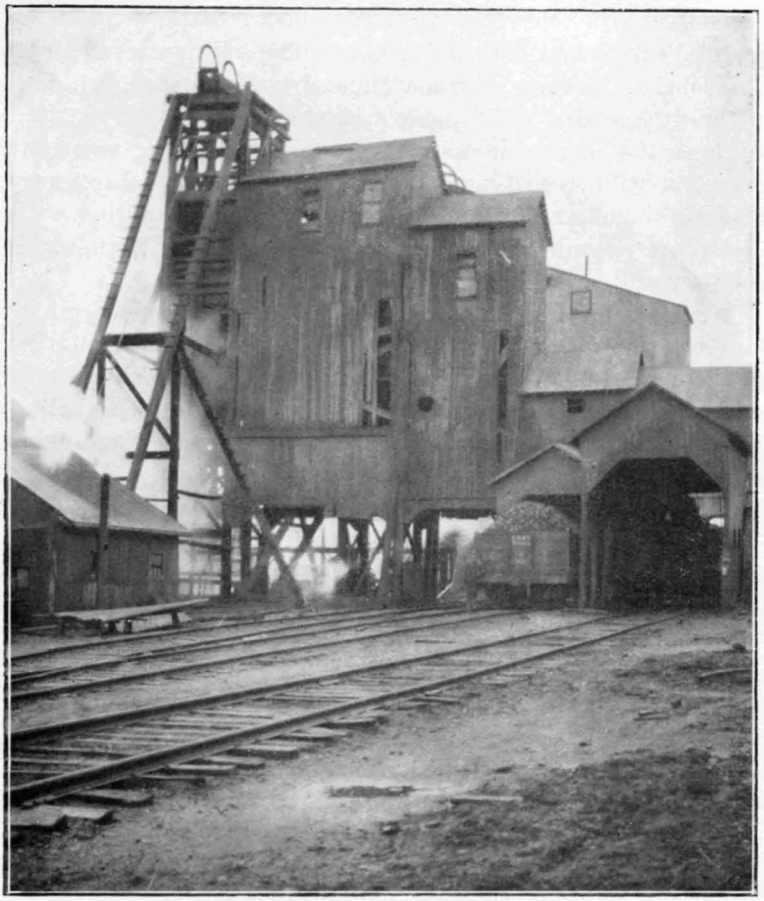
The Waverly is a sour soil, and deficient in organic foods. Considerable ditching and tile drainage is the first practical step in its improvement, and the good results become evident the first year. Crop rotation with legumes proves an advantage as well as yielding abundant forage. Soils upon which this is not done become unprofitable for the standard crops and relapse back into the marshy stage because of neglect. Well improved areas of this soil produce 30 to 50 bushels of corn; 15 to 20 bushels of wheat and 1 to 1½ tons of timothy per acre. It is well worth while to give it the needed attention.

Genesee Sandy Loam.

The soil of the Genesee sandy loam is found along the entire length of the smaller streams of the county. It consists of about 20 square miles though no part of this type is more than one-half mile wide at any place.

The soil is a light brown soil 6 to 12 inches deep. The subsoil consists of a yellow silt in which are found appreciable amounts of fine sand and gravel. The surface is a humus, easily tilled and can be worked into a fine seed bed. The soil is friable, seldom

crusting after a rain. This type is one of the most important soils for an upland farm. It furnishes a splendid tract that can be used for corn two years out of every three and yet maintain a reasonable fertility. Clover and oats make good crops to com-



Mine tipples of Crown Hill No. 1 (in foreground) and No. 3 (in background). No 3 is one of the best equipped mines of the county.

plete the rotation circle with the corn. The greater areas of the Genesee sandy loam lie along the Big and Little Vermillion rivers. In these portions of the county especially is this soil valuable as a corn soil.

The topography is uniformly level, as would be expected from its formation being laid down by the streams. In places the drain-

age is very poor, and standing water does damage to the tillage crops. Artificial drainage should be used as much as possible; however, the outlets for such drainage are not open at all times of the year.

The Genesee loam are first bottom soils and composed of reworked glacial till. The periodic inundations of the small streams assist in building up this type and giving it additional supplies of organic material. The matter of cultivation is made more difficult by the reason of the overflows, as they act as a carrier of weed seeds and also deposit a fine silty film over the surface, which gives them a splendid bed for germination. Thus the task of keeping the corn clean is often an arduous task. Because of the frequent flooding timothy has become a paying crop, principally because it is not so easily damaged by the overflows that bury it only for a few hours. Nevertheless, when the danger of the high waters can be avoided standard crops such as corn, wheat and oats yield extremely well, and also special crops of sweet-corn, beans, peas, tomatoes and beats for canning can be successfully grown.

The value of this soil ranges from $50 to $100 per acre according to its location and to the amount that lies together.

The following table shows the results of the mechanical analysis of the Genesee sandy loam:

GENESEE SANDY LOAM, FROM SECTION 26, T. 17 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–14	0.0	1.8	10.0	20.1	30.4	16.7	11.0
Subsoil	14–36	1.4	2.1	14.9	19.0	22.9	25.0	10.7

Genesee Loam.

The Genesee loam of Vermillion County lies in the valleys of the smaller streams. The entire area is very limited and of not much consequence to the agricultural development of the county. One square mile would include all of the isolated tracts.

This soil is a dark brown loam or silt loam 8 to 16 inches deep underlain by a gray or drab mottled clay loam. This soil, like all alluvial deposits, is stratified, being laid down by water. The soil is relatively uniform and shows a great persistency in maintaining

its own fertility. It is composed of particles which are light and consequently deposited in the more quiet waters farthest from the stream current.

All tracts mapped were formerly timbered with elm, soft-maple and other trees thriving in moist soils, but are now cleared and used either for tillage crops, meadows or pastures.

Corn yields from 40 to 60 bushels per acre; oats, from 30 to 60; and hay, from 1 to 3 tons per acre. Onions, cabbage and other truck crops do well upon this type.

The small tracts in Vermillion County furnish a limited advantage for intensive farming. The soil will react for commercial fertilizer but it is better to furnish the needed plant food by the green manuring, legume culture and clovers where possible. Some potash and phosphoric fertilizer even then could be used beneficially especially on that portion of the type lying above the overflow of the streams. Some organic material is transported to this soil by the overflow and from the inwash of the uplands.

The following is the table showing the mechanical analysis of the Genesee loam:

GENESEE LOAM, FROM SECTION 26, T. 17 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–14	2.7	3.7	2.6	10.9	21.6	37.5	21.0
Subsoil	14–30	5.4	5.7	3.5	12.8	17.9	25.6	29.1

Muck.

In depressed areas or otherwise uneven topography there are in many places areas that were once occupied by lakes of small size and are now outlined principally by the character of their deposits. Organic accumulations of various stages of decay make up the surface soil. It is usually an organic mold that has a tendency to retain a great amount of water during a rainy season but being of such coarse texture the surface will become dry at depths that do injury to the roots of growing plants. Thus, in either wet or dry seasons, this soil produces only very moderate crop yields. Wherever uniform drainage can be made and the excess of plant mold oxidized to a finer soil the muck soils produce good yields of special crops, such as cabbage, onions, celery and other truck crops.

Muck soils are usually deficient in available potassium or potash.

Vermillion County has only a few small tracts of soil of this type, being principally near the Wabash River and along the border of the prairie land west and north of Perryville. In all there is one square mile and some of this can be improved so as to make the best of land for intensive agriculture.

MUCK TAKEN FROM SECTION 7, T. 19 N., R. 9 W.

Description.	Depth, Inches.	Gravel and Organic Matter, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-14	6.4	15.0	6.8	19.6	30.1	21.3	10.2
Subsoil	14-36	10.4	10.7	9.2	15.1	30.7	20.0	11.8

Carrington Black Clay Loam.

The Carrington black clay loam type consists of isolated, irregular areas located in the promisciously arranged depressions of the Miami series division. It is a black clay soil, very high in organic matter, and is underlain by a dark gray mottled subsoil. The soil and subsoil are of glacial till in addition to the organic loam that has been added to the soil by swamp plant, due to the insufficient drainage which gave them opportunity for a rank growth. The many years of constant accumulation of the plant remaining gave the soil its dark color and fertile quality. Decaying plants liberate to the soil the necessary plant-food for a vigorous vegetation. These types of soil make some of the best productive agricultural lands. When well drained it becomes one of the best corn soils, though because of its perviousness it has not proven a good soil for winter wheat or rye. The soil on freezing has a tendency to be torn apart by the vertical ice crystallization which plays havoc to the roots of the seedling. This has caused the tillage crops of this type to be limited to corn.

Clover does well and produces a very rank growth. Oats grow so rapidly that lodging is caused by the winds.

The Carrington soils yield readily to the seeding preparations; a quality that proves a great advantage to its proficiency. Grasses, as timothy or blue grass, make profitable returns. Some of the best upland meadows are found upon the Carrington black clay loam.

The type is easily differentiated by its dark to black color as seen in the spring of the year and its rank growth of vegetation.

Confusion in Vermillion County, however, may be made with the Marshall series which are found in the prairie region.

The Carrington was formerly a timbered soil, which will assist in its identification. The soils about it are timber-bearing also.

Up to the present time the Carrington soil has given the farmer very little thought concerning its limited fertility; however, many have noticed that the yields of a few years ago were of a better quality and larger than the present. As this has not advanced far, the legumes and clovers will prolong almost indefinitely the present yields, especially by the occasional addition of some phosphate and potash fertilizer.

The Vermillion County area covers nearly five square miles.

SIOUX SERIES.

In the eastern part of Vermillion County are the most beautifully defined terraces. These second bottoms are from 20 to 30 feet above the first bottom land; the division being marked by a distinct bluff throughout the whole extent of the terraces in the county. The western boundary of the series is just as well defined by a distinct bluff line of the rolling uplands (Miami series).

Thus one of the best marked types is outlined even to the untrained eye as a beautiful formation of one massive remain of the work of the glacier drifts. The old bed of the ancient river that drained the melting glacier had a much wider bed through which it meandered than the present stream. The heavy load of sediment of gravel and sand was deposited within this bed, forming the terraces of deep gravel subsoil and sandy soil of the present day. The present first bottom land of the Wabash is therefore very recent deposits geologically made by the streams which has cut down a valley within the gravel deposits. This gives us a brief explanation of the bluff lines that form the east and west boundaries of this type.

Local names are given to different areas of this terrace, according to its geographical location or some peculiar characteristic, as Walnut Mound, Helts, Newport and Sand. These are given in order from the southern to northern portions. The Sioux series is divided into four types shown by different legendary markings and described under the names Sioux Sandy Loam, Sioux Sandy Gravelly Loam, Sioux Loam and Sioux Fine Sandy Loam.

The area of the types and series is given in the following table:

SIOUX SERIES.

Types.	*Areas.*
Sioux Sandy Loam	10 square miles
Sioux Sandy Gravelly Loam	5 square miles
Sioux Loam	4 square miles
Sioux Fine Sandy Loam	6 square miles
Total Sioux Series	25 square miles

Sioux Sandy Loam.

The Sioux sandy loam is a brown coarse to medium sandy loam from 10 to 24 inches deep, containing a great amount of organic material. The color becomes lighter with depth.

The subsoil over wide areas consists of almost pure waterworn gravel which is found at an average depth of 30 inches. The subsoil, however, varies considerably, and the gravel is frequently bedded in a matrix of sandy loam, silty sand or sand. This type makes up the greater portion of the Vermillion County terraces, appearing as it does under various local names.

The topography is undulating to gently rolling and is even too well drained where the gravelly subsoil rises near the surface. The crops show the effect of the scanty rainfall upon this soil more than any described previously. This, however, fits this type especially for early short seasoned crops. It would make a splendid soil for early intensive farming. Yet, because of the rather equal distribution of the rainfall throughout the entire growing season corn produces favorable yields. Hay, alfalfa and oats are uncertain depending altogether upon the moisture conditions. As an average year corn yields from 40 to 60 bushels, oats from 30 to 50 bushels, and wheat from 10 to 20 bushels. The value of the Sioux sandy loam ranges from $80 to $150 per acre.

The following table shows the mechanical analysis of the Sioux sandy loam.

SIOUX SANDY LOAM, FROM SECTION 22, T. 14 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0–14	1.1	0.5	30.1	20.0	20.4	15.6	12.4
Subsoil	14–30	5.2	4.1	19.7	26.2	13.7	20.2	10.9

Sioux Sandy Gravelly Loam.

The Sioux sandy gravelly loam consists of about 12 inches of dark brown to black loamy sand or light sandy loam, containing a few small gravel and a considerable amount of organic matter. The sand content is made up of all grades from fine to coarse sand or small gravel, but the medium sand predominates.

The subsoil is composed of layers of gravel and coarse sand which often occur in strata of uniform thickness. The gravel particles vary in size from coarse sand to small cobbles several inches in diameter and the interstial material consists of various grades of sand.

Many commercial gravel banks are opened in this type both along roads that have been paved with the finer gravel and along the Chicago and Eastern Illinois Railroad. However, the largest pit belonging to the Chicago and Eastern Illinois is one of finer gravel opened in the Sioux sand loam type at Dickason.

During a rainy season the Sioux sandy gravelly loam produces good yields, but if a difficiency of rainfall occurs during the growing season or even during the ripening period the crops show the result of lack of moisture.

The crops upon this type are uncertain and give profitable yields only during a moist season.

The value of the land based upon the raising of early maturing crops ranges from $60 to $100 per acre.

Deep rooted plants, as alfalfa or alsike clover, make good permanent pastures and assist in the industry of dairying. In this the soil has proven valuable; however, the seeding is rather difficult. Small tracts of melons are grown upon the soil and the quality produced is excellent.

The following table gives the mechanical analysis of the Sioux sandy gravelly loam:

SIOUX SANDY GRAVELLY LOAM, FROM SECTION 16, T. 18 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-10	0.0	1.2	3.3	15.5	41.5	15.0	22.6
Subsoil	10-30	4.5	2.4	5.1	11.7	40.3	15.8	20.2

Sioux Loam.

The Sioux loam consists of a brown slightly sandy loam about 18 inches deep. The surface is friable, easily worked, free from stones and coarse gravel.

The subsoil has a depth varying between 20 and 40 inches and consisting of a brownish-yellow loam. This is underlain by a reddish gravelly loam overlying a bed of gravel. The type constitutes the higher terraces and has a level topography. As a general rule in Vermillion County this soil is used for general farm purposes; however, it would prove a favorable type for tillage crops for canning purposes. The area of the county is rather limited, the largest tract being a few miles southwest of Perrysville.

Corn is a favorable crop on this type and produces a good yield. Oats and wheat yield profitably. Small tracts of timothy meadow give a desirable quality of hay, yielding from one and one-half to two tons per acre. This soil is valued at $100 per acre and most of the type in the county is owned by farmers who have made the best of improvements upon it, in regard to buildings and fencing.

The following table shows the mechanical analysis of the Sioux loam:

SIOUX LOAM, FROM SECTION 18, T. 18 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-14	0.2	1.6	5.3	21.1	27.0	33.5	14.3
Subsoil	14-30	0.3	2.4	3.6	10.4	21.1	24.0	10.1

Sioux Fine Sandy Loam.

The Sioux fine sandy loam is composed of a dark-grey or black fine sandy loam soil from 10 to 15 inches deep, containing a relatively high percentage of organic matter. The subsoil is a fine to medium sandy loam of a light brown color. At from 3 to 8 feet below the surface the material changes to sand and gravel. The topography is generally level. This soil occupies the river terraces along with the three previous types and is a good soil for trucking. Tracts of timothy and clover, or blue grass furnished favorable pastures for dairying or beef cattle.

This is also desirable soil for wheat, corn and oats. It is easily prepared for seeding, and is unusually free from excessive growth of weeds.

Small plots of alfalfa are doing well but are not of sufficient age to insure permanency; still there is every advantage in the character of the soil and the location to prove a desirable type for this plant.

The valuation of the Sioux fine sandy loam varies from $80 to $125 per acre.

The following table shows the mechanical analysis of the Sioux fine sandy loam:

SIOUX FINE SANDY LOAM, FROM SECTION 20, T. 18 N., R. 9 W.

Description.	Depth, Inches.	Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt, Per Cent.	Clay, Per Cent.
Soil	0-12	6.8	4.1	11.6	33.1	13.0	34.7	11.6
Subsoil	12-30	2.0	3.3	12.2	34.6	15.0	21.1	9.8

EXPLANATIONS AND DIRECTIONS FOR THE USE OF THE SOIL MAP.

The soil map has been prepared with especial care and detail so that it may be used readily by anyone. The writer deems it necessary to give a detailed description and exemplary method of searching out and applying the information given. Any farm may be located and described with ease when once the method is understood. The "Legend" on the upper right hand corner should be studied in order to be able to distinguish the conventional signs for homes, churches, schoolhouses, soil divisions, mines, gravel pits, etc. Then, paying no attention to the soil-type identifications, it will be possible to find the home of the farm sought, being also guided by the direction from the nearest town, the roads and sections. For example, west of Highland two and one-half miles there is a road leading to the south, then west; a short distance from the road in Section 32, about the center of the north half there is a square dot that represents a farm home. This one is located in clear portion on the map. The soil type list gives the identification as "Miami Silt Loam." To the west of this house is another type represented by horizontal dash and dot alternately.

In the soil type list it is identified as the "Miami Silt Loam." This is usually rather rolling land.

Just north of the same house flows a little stream and the type that lies in that narrow bottom is represented by fine dots. In the list of types at the left it is named "Genesee Sandy Loam."

After all the types are found that cover the desired territory, then the descriptions of each should be read in the paper headed "Soil Types." Association of these descriptions to the land would indeed be excellent checks upon the information in this report. The scale of miles is given at the bottom of the map and will be a check upon the distance traversed.